Global LCD Panel Exchange Center www.panelook.com 屏库:全球液晶屏交易中心

SPECIFICATION
FOR
APPROVAL

( ) Preliminary Specification
(●) Final Specification

Title	22.0” WXGA TFT LCD

BUYER	
MODEL	

SUPPLIER	LG Display Co., Ltd.
*MODEL	LC220WXE
SUFFIX	TBA1(RoHS Verified)

*When you obtain standard approval,
please use the above model name without suffix

APPROVED BY	SIGNATURE / DATE
/	
/	
/	

Please return 1 copy for your confirmation with your signature and comments.

APPROVED BY	SIGNATURE / DATE
J.H. Lee / Team Leader	
REVIEWED BY	
H.S. Song / Project Leader	
PREPARED BY	
B.J. Choi / Engineer	

TV Product Development Dept.
LG Display Co., Ltd.

One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory! www.panelook.com

Global LCD Panel Exchange Center www.panelook.com 屏库:全球液晶屏交易中心

Contents

Number	ITEM	Page
	COVER	1
	CONTENTS	2
	RECORD OF REVISIONS	3
1	GENERAL DESCRIPTION	4
2	ABSOLUTE MAXIMUM RATINGS	5
3	ELECTRICAL SPECIFICATIONS	6
3-1	ELECTRICAL CHARACTERISTICS	6
3-2	INTERFACE CONNECTIONS	8
3-3	SIGNAL TIMING SPECIFICATIONS	10
3-4	SIGNAL TIMING WAVEFORMS	12
3-5	COLOR INPUT DATA REFERENCE	13
3-6	POWER SEQUENCE	14
4	OPTICAL SPECIFICATIONS	16
5	MECHANICAL CHARACTERISTICS	20
6	RELIABILITY	23
7	INTERNATIONAL STANDARDS	24
7-1	SAFETY	24
7-2	EMC	24
8	PACKING	25
8-1	DESIGNATION OF LOT MARK	25
8-2	PACKING FORM	25
9	PRECAUTIONS	26
9-1	MOUNTING PRECAUTIONS	26
9-2	OPERATING PRECAUTIONS	26
9-3	ELECTROSTATIC DISCHARGE CONTROL	27
9-4	PRECAUTIONS FOR STRONG LIGHT EXPOSURE	27
9-5	STORAGE	27
9-6	HANDLING PRECAUTIONS FOR PROTECTION FILM	27

One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory! www.panelook.com

Global LCD Panel Exchange Center www.panelook.com 屏库:全球液晶屏交易中心

Record of Revisions

Revision No.	Revision Date	Page	Description
1.0	Dec. 29. 2008		Final Specification

One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory! www.panelook.com

Global LCD Panel Exchange Center www.panelook.com 屏库:全球液晶屏交易中心

1. General Description

The LC220WXE is a Color Active Matrix Liquid Crystal Display with an integral Cold Cathode Fluorescent Lamp (CCFL) backlight system. The matrix employs a-Si Thin Film Transistor as the active element.

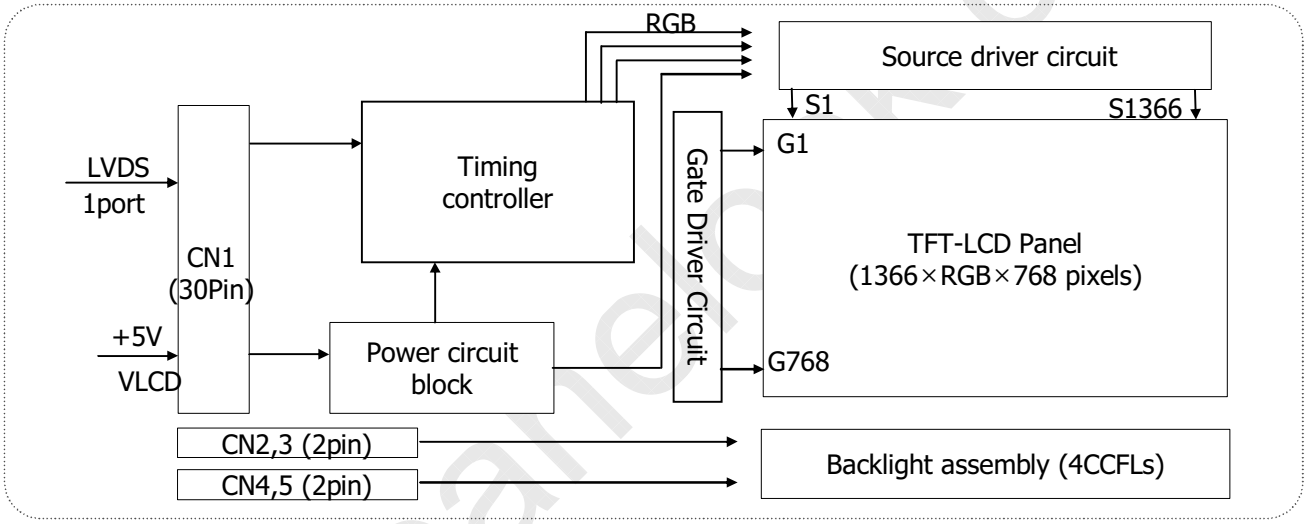
It is a transmissive type display operating in the normally white mode. It has a 21.6 inch diagonally measured active display area with WXGA resolution (768 vertical by 1366 horizontal pixel array)

Each pixel is divided into Red, Green and Blue sub-pixels or dots which are arranged in vertical stripes.

Gray scale or the luminance of the sub-pixel color is determined with a 8bit gray scale signal for each dot, thus presenting a palette of more than 16.7M(6bit+A-FRC) colors.

It has been designed to apply the 8-bit 1 port LVDS interface.

It is intended to support LCD TV, PCTV where thin thickness, wide viewing angle, low power are critical factors and fast response time are important.



General Features

Active Screen Size	21.6 inches(548.6mm) diagonal
Outline Dimension	501.0 mm(H) x 297.0 mm(V) x 17.3 mm(D) (Typ.)
Pixel Pitch	116.5㎛ x 349.5㎛ x RGB
Pixel Format	1366 horiz. by 768 vert. pixels RGB stripe arrangement
Color Depth	8-bit(D), 16.7 M colors
Luminance, White	350 cd/m^2 (Center 1 point Typ.)
Viewing Angle (CR>10)	R/L 170(Typ.), U/D 155(Typ.)
Power Consumption	Total 26.05 W (Typ.) (Logic= 2.05W, Back Light=24 W @ IBL=7.5mA)
Weight	2,300 g (Typ.)
Display Operating Mode	Transmissive mode, Normally white
Surface Treatment	Hard coating(3H), Anti-glare treatment of the front polarizer (Haze 25%)

One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory! www.panelook.com

Global LCD Panel Exchange Center www.panelook.com 屏库:全球液晶屏交易中心

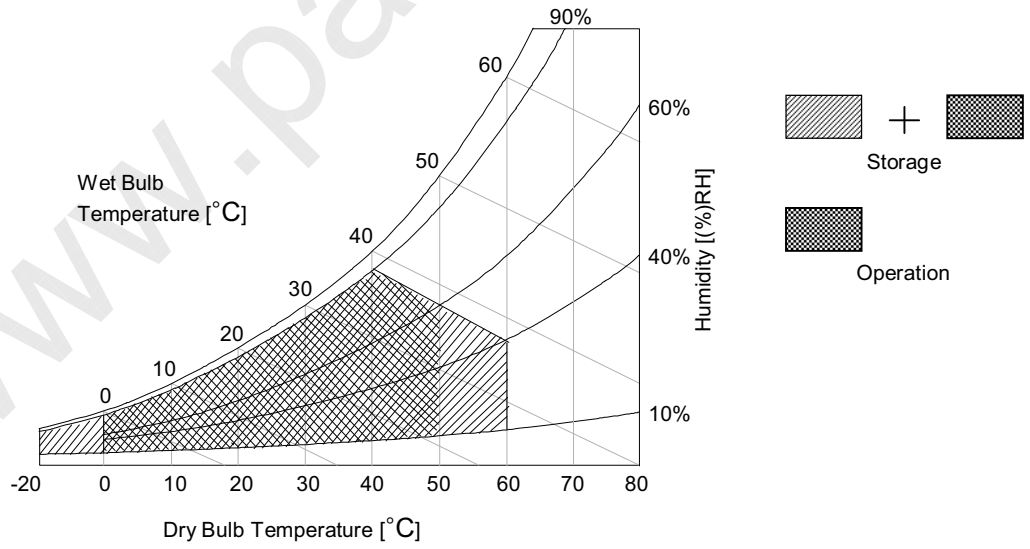
2. Absolute Maximum Ratings

The following items are maximum values which, if exceeded, may cause faulty operation or damage to the LCD module.

Table 1. ABSOLUTE MAXIMUM RATINGS

Parameter		Symbol	Value		Unit	Remark
			Min	Max		
Power Input Voltage	LCD circuit	VLCD	-0.3	+6.0	V [DC]	at 25 ± 2 °C
Operating Temperature		TOP	0	+50	°C	Note 1
Storage Temperature		TST	-20	+60	°C	
Operating Ambient Humidity		HOP	10	90	%RH	
Storage Humidity		HST	10	90	%RH	

Note : 1. Temperature and relative humidity range are shown in the figure below.
Wet bulb temperature should be Max. 39 °C and no condensation of water.
2. Gravity mura can be guaranteed below 40℃ condition.



One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory! www.panelook.com

Global LCD Panel Exchange Center www.panelook.com 屏库:全球液晶屏交易中心

3. Electrical Specifications

3-1. Electrical Characteristics

It requires two power inputs. One is employed to power for the LCD circuit. The other is used for the CCFL backlight circuit.

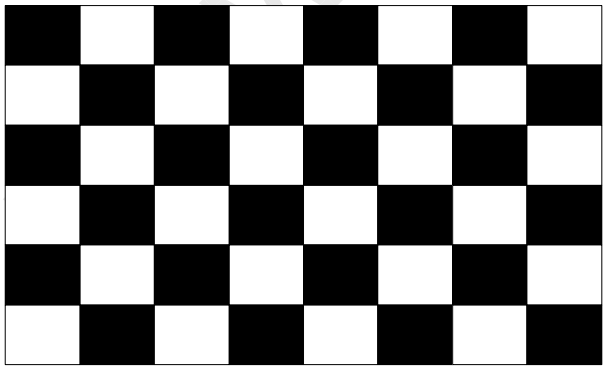
Table 2. ELECTRICAL CHARACTERISTICS

Parameter	Symbol	Value			Unit	Note
		Min	Typ	Max		
MODULE :						
Power Input Voltage	V_{LCD}	4.5	5.0	5.5	V_{DC}	
Permissive Power Input Ripple	V_{LCD}	-	-	0.2	V	3
Power Input Current	I_{LCD}	-	410	533	mA	1
		-	500	650	mA	2
Power Consumption	P_{LCD}	-	2.05	2.67	Watt	1
Rush current	I_{RUSH}	-	-	3.0	A	4

Note :

1. The specified current and power consumption are under the V_{LCD}=5.0V, 25 ± 2°C, f_V=60Hz condition whereas mosaic pattern(8 x 6) is displayed and f_V is the frame frequency.
2. The current is specified at the maximum current pattern. (Black Pattern)
3. Permissive power ripple should be measured under VCC=5.0V, 25°C, fV (frame frequency)=60Hz condition and At that time, we recommend the bandwidth configuration of oscilloscope is to be under 20MHz. And the Power input ripple is specified at full Black pattern
4. The duration of rush current is about 2ms and rising time of power Input is 0.5ms(min.).

White : 255 Gray
Black : 0 Gray



Mosaic Pattern(8 x 6)

Black : 0 Gray

Black Pattern

One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory! www.panelook.com

Global LCD Panel Exchange Center www.panelook.com 屏库:全球液晶屏交易中心

Table 3. Electrical characteristics

Parameter	Symbol	Values			Unit	Notes
		Min	Typ	Max		
LAMP :						
Operating Voltage	V_{BL}	780	800	960	V_{RMS}	1, 2
Operating Current	I_{BL}	3.0	7.5	8.0	mA_{RMS}	1
Established Starting Voltage	Vs					1, 3
at 25 °C				1400	V_{RMS}	
at 0 °C				1700	V_{RMS}	
Operating Frequency	f_{BL}	35	60	80	kHz	4
Burst Dimming Duty	{ a/T } * 100	20			%	11
Burst Dimming Frequency	1/T	95	-	182	Hz	11
Discharge Stabilization Time	T_S	-	-	3	Min	1, 5
Power Consumption	P_{BL}		24	26.4	Watt	6
Life Time		50,000	-		Hrs	1, 7

Note :

The design of the inverter must have specifications for the lamp in LCD Assembly.
The performance of the Lamp in LCM, for example life time or brightness, is extremely influenced by the characteristics of the DC-AC inverter. So all the parameters of an inverter should be carefully designed so as not to produce too much leakage current from high-voltage output of the inverter.
When you design or order the inverter, please make sure unwanted lighting caused by the mismatch of the lamp and the inverter (no lighting, flicker, etc) never occurs. When you confirm it, the LCD–Assembly should be operated in the same condition as installed in you instrument.

※ Do not attach a conducting tape to lamp connecting wire. If the lamp wire attach to a conducting tape, TFT-LCD Module has a low luminance and the inverter has abnormal action.
Because leakage current is occurred between lamp wire and conducting tape.

1. Specified values are for a single lamp.
2. Operating voltage is measured at 25 ± 2°C. The variance of the voltage is ± 10%.
3. The voltage above V_S should be applied to the lamps for more than 1 second for start-up.
   (Inverter open voltage must be more than lamp starting voltage.)

Otherwise, the lamps may not be turned on. The used lamp current is the lamp typical current.

4. Lamp frequency may produce interference with horizontal synchronous frequency. As a result, the may cause beat on the display. Therefore, lamp frequency shall be away as much as possible from the horizontal synchronous frequency and its harmonics range in order to prevent interference.
5. Let's define the brightness of the lamp after being lighted for 5 minutes as 100%.
   T_S is the time required for the brightness of the center of the lamp to be not less than 95%.
6. The lamp power consumption shown above does not include loss of external inverter.
   The used lamp current is the lamp typical current. ($P_{BL} = V_{BL} \times I_{BL} \times N_{Lamp}$)
7. The life is determined as the time at which brightness of the lamp is 50% compared to that of initial value at the typical lamp current on condition of continuous operating at 25 ± 2°C.

One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory! www.panelook.com

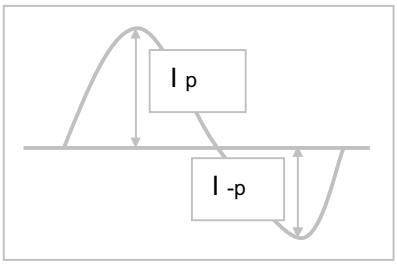
Global LCD Panel Exchange Center www.panelook.com 屏库:全球液晶屏交易中心

Note :

8. The output of the inverter must have symmetrical(negative and positive) voltage waveform and symmetrical current waveform (Unsymmetrical ratio is less than 10%). Please do not use the inverter which has unsymmetrical voltage and unsymmetrical current and spike wave. Requirements for a system inverter design, which is intended to have a better display performance, a better power efficiency and a more reliable lamp, are following.It shall help increase the lamp lifetime and reduce leakage current.

   a. The asymmetry rate of the inverter waveform should be less than 10%.
   b. The distortion rate of the waveform should be within $\sqrt{2} \pm 10\%$.

   * Inverter output waveform had better be more similar to ideal sine wave.



* Asymmetry rate:

$| I_p - I_{-p} | / I_{rms} \times 100\%$

* Distortion rate

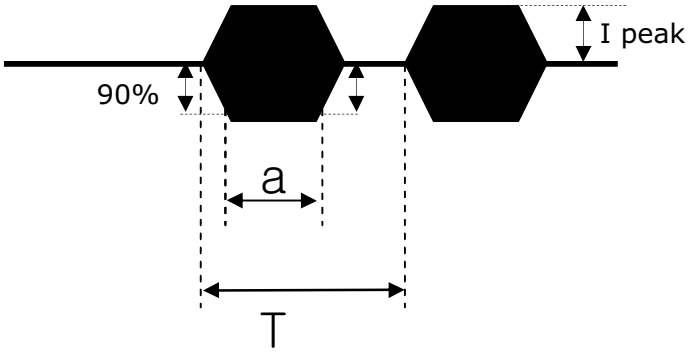
I_p (or I_{-p}) / I_{rms}

9. The inverter which is combined with this LCM, is highly recommended to connect coupling(ballast) condenser at the high voltage output side. When you use the inverter which has not coupling(ballast) condenser, it may cause abnormal lamp lighting because of biased mercury as time goes.
10. In case of edgy type back light with over 4 parallel lamps, input current and voltage wave form should be synchronized (continuous lamps)
11. The reference method of burst dimming duty ratio.
    It is recommended to use synchronous V-sync frequency to prevent waterfall (Vsync x 2 =Burst Frequency)
    a. Burst dimming duty should be 100% for 1second after turn on
    b. It is recommended not to sustain long time
    c. Burst dimming duty should be used in typical current ± 10%

※ Dimming current output rising and falling time may produce humming and inverter trans' sound noise.
※ partial darkness area during the low duty might be happened

Output of Lamp(low side)

I out Duty={ a/T } * 100



One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory! www.panelook.com

Global LCD Panel Exchange Center www.panelook.com 屏库:全球液晶屏交易中心

3-2. Interface Connections

This LCD employs two kinds of interface connections, a 30 pin connector is used for the module electronics and 2Pin / 2Pin Connectors are used for the integral backlight system.

3-2-1. LCD Module

- LCD Connector(CN1) : KDF71G-30S-1H(Hirose) or FI-X30SSL-HF(JAE)
- Mating Connector : : FI-X30C2L (Manufactured by JAE) or Equivalent

Table 4. MODULE CONNECTOR(CN1) PIN CONFIGURATION

Pin No.	Symbol	Description	Note
1	NC	No Connection	1
2	PWM_OUT	Reference signal for inverter control	2
3	NC	No Connection	
4	GND	Ground	
5	RX0-	LVDS Receiver Signal(-)	
6	RX0+	LVDS Receiver Signal(+)	
7	GND	Ground	
8	RX1-	LVDS Receiver Signal(-)	
9	RX1+	LVDS Receiver Signal(+)	
10	GND	Ground	
11	RX2-	LVDS Receiver Signal(-)	
12	RX2+	LVDS Receiver Signal(+)	
13	GND	Ground	
14	RXCLK-	LVDS Receiver Clock Signal(-)	
15	RXCLK+	LVDS Receiver Clock Signal(+)	
16	GND	Ground	
17	RX3-	LVDS Receiver Signal(-)	
18	RX3+	LVDS Receiver Signal(+)	
19	GND	Ground	
20	NC	No Connection	
21	NC	No Connection	
22	NC	No Connection	
23	GND	Ground	
24	GND	Ground	
25	GND	Ground	
26	VLCD	Power Supply +5.0V	
27	VLCD	Power Supply +5.0V	
28	VLCD	Power Supply +5.0V	
29	VLCD	Power Supply +5.0V	
30	VLCD	Power Supply +5.0V	

Notes: 1. Specific pin No. **#1** is used for “No signal detection” of system signal interface.
It should be GND for **NSB (No Signal Black)** during the system interface signal is not.
If this pin is “H”, LCD Module displays **AGP (Auto Generation Pattern).**
2. Specific pin No. **#2** (PWM_OUT) is a reference signal for inverter control.
This PWM signal is synchronized with vertical frequency.
Its frequency is 3 times of vertical frequency, and its duty ratio is 50%.
If the system don’t use this pin, do not connect.
3. All GND (Ground) pins should be connected together to the LCD module’s metal frame.
4. All V_{LCD} (power input) pins should be connected together.
5. All Input levels of LVDS signals are based on the **EIA 644** Standard.

One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory! www.panelook.com

Global LCD Panel Exchange Center www.panelook.com 屏库:全球液晶屏交易中心

3-2-2. Backlight Module

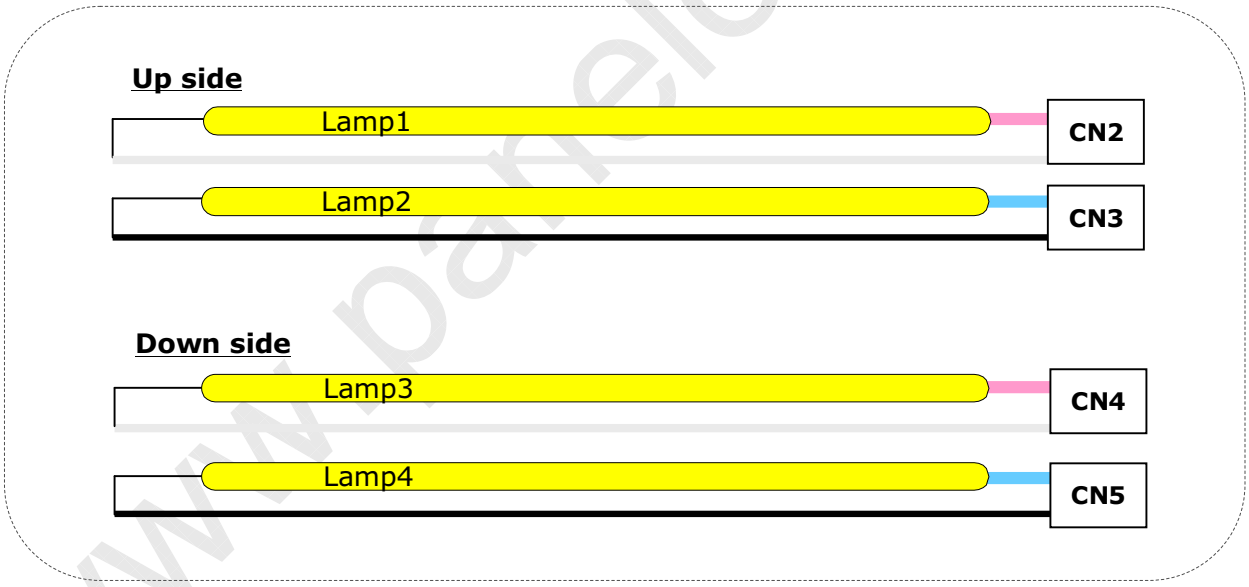
The backlight interface connector is a model 35001HS-02LD manufactured by YEONHO.
The mating connector part number are 35001WR-02L(2pin) or equivalent.
The pin configuration for the connector is shown in the table below.

Table 5. Backlight connector pin configuration(CN2,CN3,CN4,CN5)

Pin	Symbol	Description	Notes
1	HV	High Voltage for Lamp	1
2	LV	Low Voltage for Lamp	2

Notes: 1. The high voltage power terminal is colored pink, sky blue.
2. The low voltage pin color is white, black.

FIG. 5 Backlight connector diagram



www.panelook.com

One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory! www.panelook.com

Global LCD Panel Exchange Center www.panelook.com 屏库:全球液晶屏交易中心

3-3. Signal Timing Specifications

Table 6 shows the signal timing required at the input of the LVDS transmitter. All of the interface signal timings should be satisfied with the following specification for normal operation.

Table 6. TIMING TABLE for NTSC & PAL

[DE (Data Enable) Only]

ITEM	Symbol		Min	Typ	Max	Unit	Note
DCLK	Period	t_{CLK}	12.5	13.8	15.8	ns	
	Frequency	-	63	72.4	80	MHz	
Hsync	Period	t_{HT}	1488	1528	1920	t_{CLK}	
	Horizontal Valid	t_{HV}	1366	1366	1366	t_{CLK}	
	Horizontal Blank	-	t_{HP}- t_{HV}	162	t_{HP}- t_{HV}		
	Frequency	f_H	45	47.4	50	KHz	
	Width	t_{WH}	-	32	-	t_{CLK}	
	Horizontal Back Porch	t_{HBP}	32	48	-		
	Horizontal Front Porch	t_{HFP}	68	80	-		
Vsync	Period	t_{VT}	776 (894)	790 (948)	1063 (1008)	t_{HP}	Note 1) NTSC : 57~63Hz (PAL : 47~53Hz)
	Vertical Valid	t_{VV}	768	768	768	t_{HP}	
	Vertical Blank	-	t_{VP}- t_{VV}	22	t_{VP}- t_{VV}	t_{HP}	
	Frequency	f_V	57 (47)	60 (50)	63 (53)	Hz	
	Width	t_{WV}	-	5 (12)	-	t_{HP}	
	Vertical Back Porch	t_{VBP}	5	15 (128)	-	Hz	
	Vertical Front Porch	t_{VFP}	1	2 (40)	-	t_{HP}	

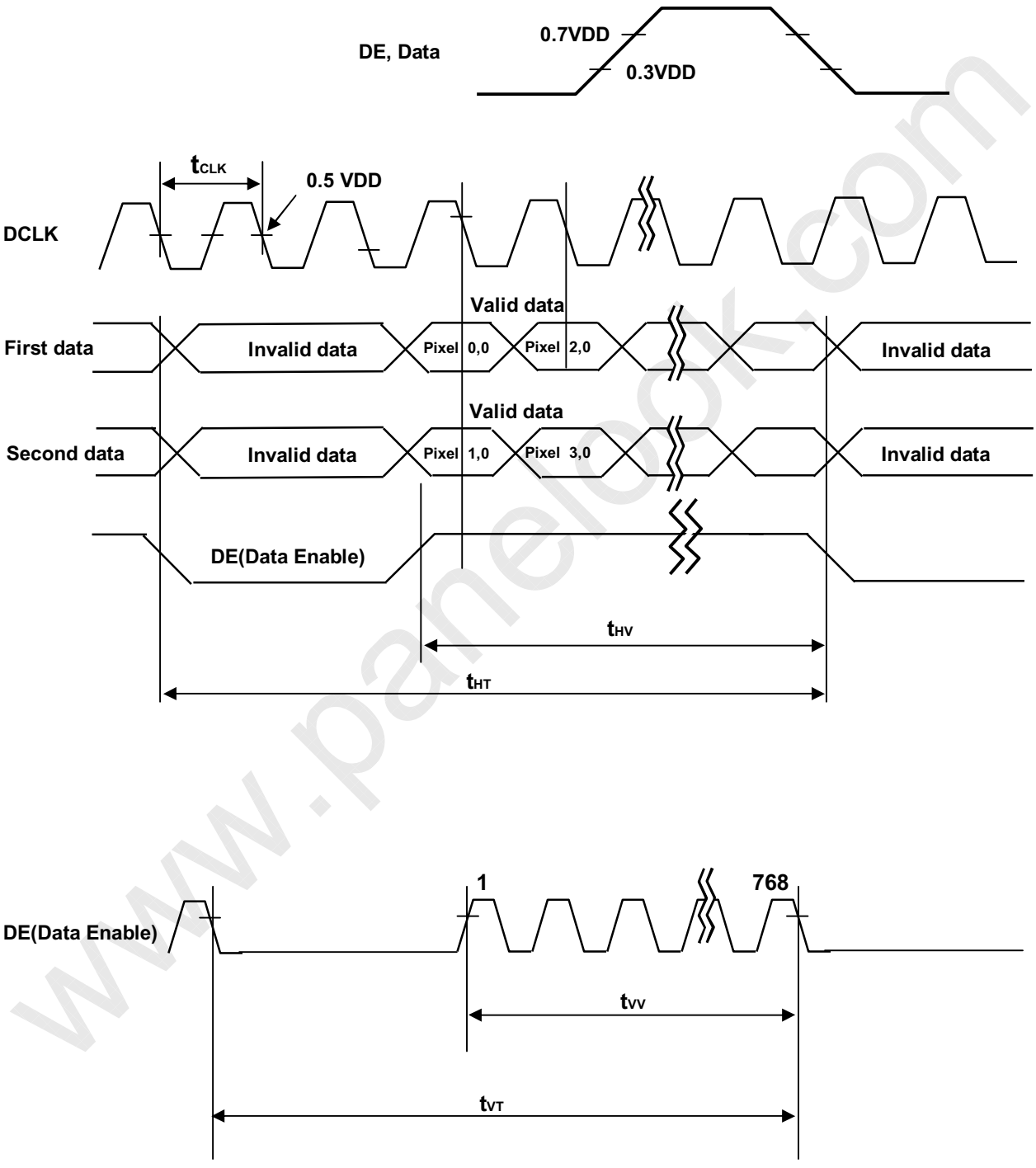
Note :

1. The input of HSYNC & VSYNC signal does not have an effect on normal operation (DE Only Mode). If you use spread spectrum of EMI, add some additional clock to minimum value for clock margin.
2. The performance of the electro-optical characteristics may be influenced by variance of the vertical refresh rate and the horizontal frequency
3. Timing should be set based on clock frequency.

One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory! www.panelook.com

Global LCD Panel Exchange Center www.panelook.com 屏库:全球液晶屏交易中心

3-4. Signal Timing Waveforms



www.panelook.com

One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory! www.panelook.com

Global LCD Panel Exchange Center www.panelook.com 屏库:全球液晶屏交易中心

3-5. Color Data Reference

The brightness of each primary color (red, green, blue) is based on the 8-bit gray scale data input for the color. The higher binary input, the brighter the color. Table 7 provides a reference for color versus data input.

Table 7. COLOR DATA REFERENCE

Color		Input Color Data																							
		RED								GREEN								BLUE							
		MSB							LSB	MSB							LSB	MSB							LSB
		R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0
Basic Color	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red (255)	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green (255)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	Blue (255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Cyan	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Magenta	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
RED	RED (000) Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED (001)	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	...					...								...								...			
	RED (254)	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED (255)	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GREEN	GREEN (000) Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GREEN (001)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	...					...								...								...			
	GREEN (254)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
	GREEN (255)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
BLUE	BLUE (000) Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	BLUE (001)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	...					...								...								...			
	BLUE (254)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0
	BLUE (255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1

www.panelook.com

One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory! www.panelook.com

Global LCD Panel Exchange Center www.panelook.com 屏库:全球液晶屏交易中心

3-6. Power Sequence

3-6-1. LCD Driving circuit

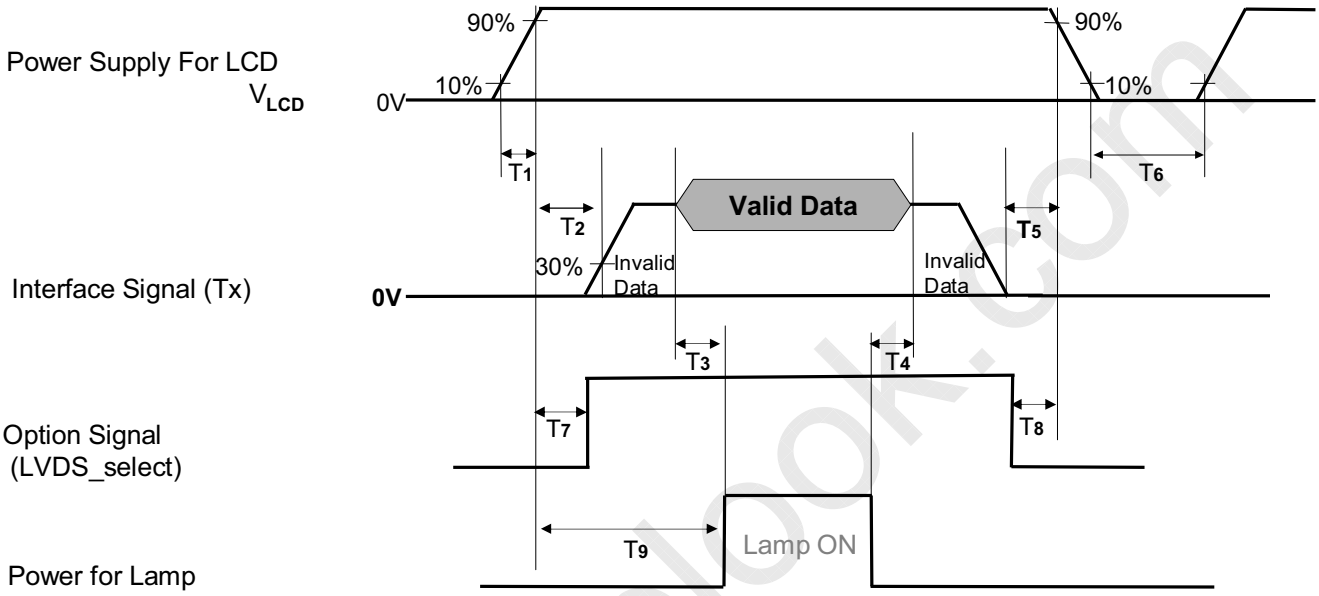


Table 8. POWER SEQUENCE

Parameter	Value			Unit	Notes
	Min	Typ	Max		
T1	0.5	-	20	ms	
T2	0.5	-	-	ms	4
T3	200	-	-	ms	3
T4	200	-	-	ms	3
T5	0	-	-	ms	
T6	2.0	-	-	s	5
T7	0.5	-	T2	ms	4
T8	0	-	-	ms	4
T9	$T_2 + T_3$	-	5	s	

Note : 1. Please avoid floating state of interface signal at invalid period.
2. When the interface signal is invalid, be sure to pull down the power supply V_{LCD} to 0V.
3. The T3/T4 is recommended value, the case when failed to meet a minimum specification, abnormal display would be shown. There is no reliability problem.
4. If the on time of signals(Interface signal and Option signals) precedes the on time of Power(V_{LCD}), it will be happened abnormal display.
5. T6 should be measured after the Module has been fully discharged between power off and on period.

One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory! www.panelook.com

Global LCD Panel Exchange Center www.panelook.com 屏库:全球液晶屏交易中心

4. Optical Specification

Optical characteristics are determined after the unit has been 'ON' and stable in a dark environment at 25±2°C. The values specified are at an approximate distance 50cm from the LCD surface at a viewing angle of Φ and θ equal to 0 °.
FIG. 1 shows additional information concerning the measurement equipment and method.

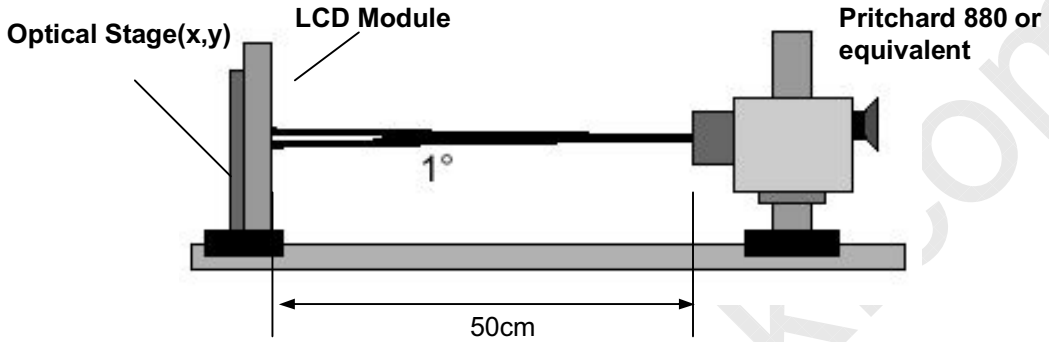


FIG. 1 Optical Characteristic Measurement Equipment and Method

Table 11. OPTICAL CHARACTERISTICS

Ta= 25±2°C, V_{LCD}=5.0V, fv=60Hz, Dclk=72.4MHz, IBL=7.5mA

Parameter		Symbol	Value			Unit	Note
			Min	Typ	Max		
Contrast Ratio		CR	700	1000	-		1
Surface Luminance, white		L_{WH}	280	350	-	cd/m^2	2
Luminance Variation		δ_{WHITE} 5P			1.3		3
Response Time	Rising time	Tr_R		1.1	1.7	ms	4
	Falling time	Tr_D		3.9	5.9		
Color Coordinates [CIE1931]	RED	Rx	Typ -0.03	0.642	Typ +0.03		
		Ry		0.333			
	GREEN	Gx		0.295			
		Gy		0.608			
	BLUE	Bx		0.147			
		By		0.063			
	WHITE	Wx		0.285			
		Wy		0.293			
Viewing Angle (CR>10)							
	x axis, right(ϕ=0°)	θr	70	85	-	degree	5
	x axis, left (ϕ=180°)	θl	70	85	-		
	y axis, up (ϕ=90°)	θu	60	70	-		
	y axis, down (ϕ=270°)	θd	70	85	-		
Crosstalk					1.5	%	
Gray Scale			-	2.2	-		6

One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory! www.panelook.com

Global LCD Panel Exchange Center www.panelook.com 屏库:全球液晶屏交易中心

Notes :1. Contrast Ratio(CR) is defined mathematically as :

$$CR = \frac{\text{Surface Luminance at all white pixels}}{\text{Surface Luminance at all black pixels}}$$

It is measured at center 1-point.

2. Surface luminance is determined after the unit has been 'ON' and 1Hour after lighting the backlight in a dark environment at 25±2°C. Surface luminance is the luminance value at center 1-point across the LCD surface 50cm from the surface with all pixels displaying white. For more information see the FIG. 2.

3. The variation in surface luminance , δ WHITE is defined as :
δ WHITE(5P) = Maximum(L_{on1},L_{on2}, L_{on3}, L_{on4}, L_{on5}) / Minimum(L_{on1},L_{on2}, L_{on3}, L_{on4}, L_{on5})
Where L_{on1} to L_{on5} are the luminance with all pixels displaying white at 5 locations .
For more information, see the FIG. 2.

4. Response time is the time required for the display to transit from black to white (Decay time, Tr_D) and from white to black (Rise Time, Tr_R). For additional information see the FIG. 3.

5. Viewing angle is the angle at which the contrast ratio is greater than 10. The angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to the LCD module surface. For more information, see the FIG. 4.

6. Gray scale specification
Gamma Value is approximately 2.2. For more information, see the Table 10.

Table 10. GRAY SCALE SPECIFICATION

Gray Level	Luminance [%] (Typ.)
L0	0.10
L15	0.34
L31	1.17
L47	2.63
L63	4.80
L79	7.60
L95	11.1
L111	15.4
L127	20.5
L143	26.9
L159	34.4
L175	43.5
L191	54.5
L207	66.8
L223	78.7
L239	90.2
L255	100

One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory! www.panelook.com

Global LCD Panel Exchange Center www.panelook.com 屏库:全球液晶屏交易中心

Measuring point for surface luminance & measuring point for luminance variation.

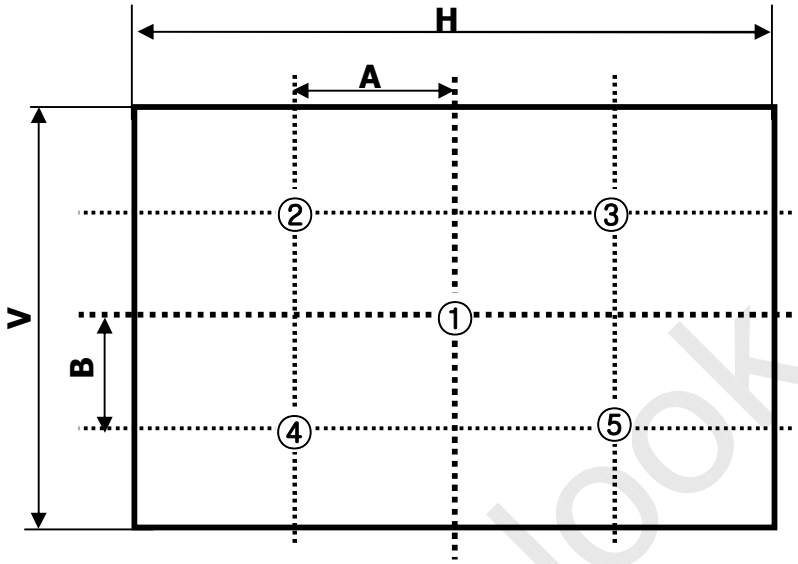


FIG. 2 5 Points for Luminance Measure

Response time is defined as the following figure and shall be measured by switching the input signal for each gray to gray.

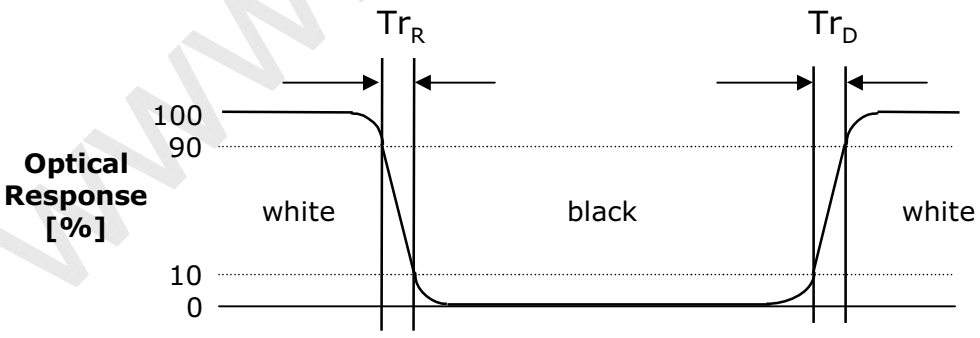


FIG. 3 Response Time

One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory! www.panelook.com

Global LCD Panel Exchange Center www.panelook.com 屏库:全球液晶屏交易中心

Dimension of viewing angle range

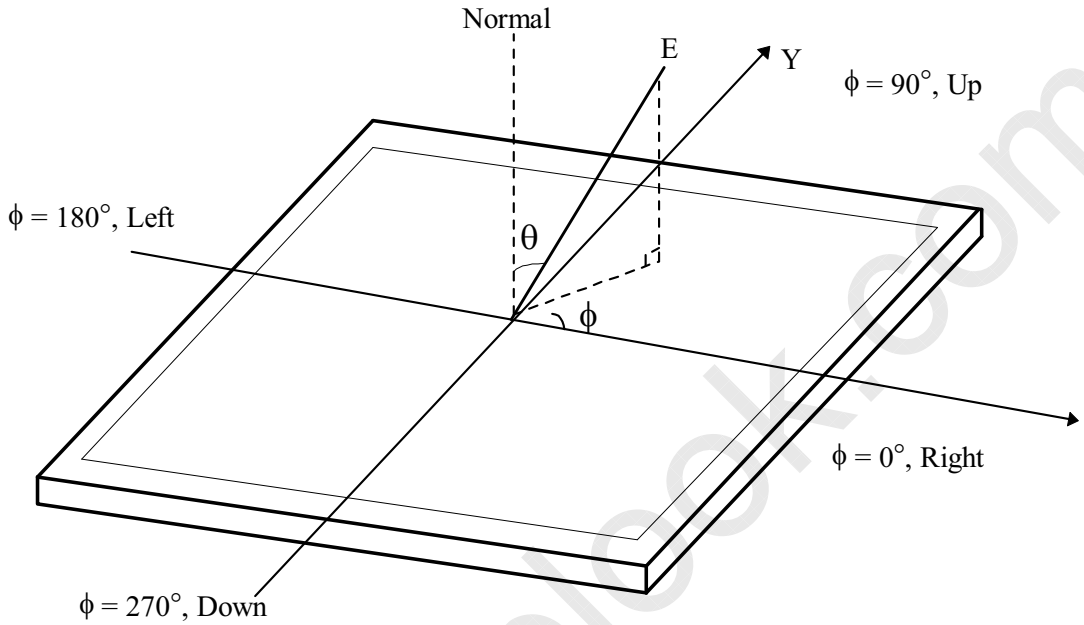


FIG. 4 Viewing Angle

www.panelook.com

One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory! www.panelook.com

Global LCD Panel Exchange Center www.panelook.com 屏库:全球液晶屏交易中心

5. Mechanical Characteristics

Table 11 provides general mechanical characteristics.

Table 11. MECHANICAL CHARACTERISTICS

Item	Value	
Outline Dimension	Horizontal	501.0 mm
	Vertical	297.0 mm
	Depth	17.3 mm
Bezel Area	Horizontal	481.5 mm
	Vertical	272.5 mm
Active Display Area	Horizontal	477.417 mm
	Vertical	268.416 mm
Weight	2,300 g (Typ.) , 2500 g (Max.)	

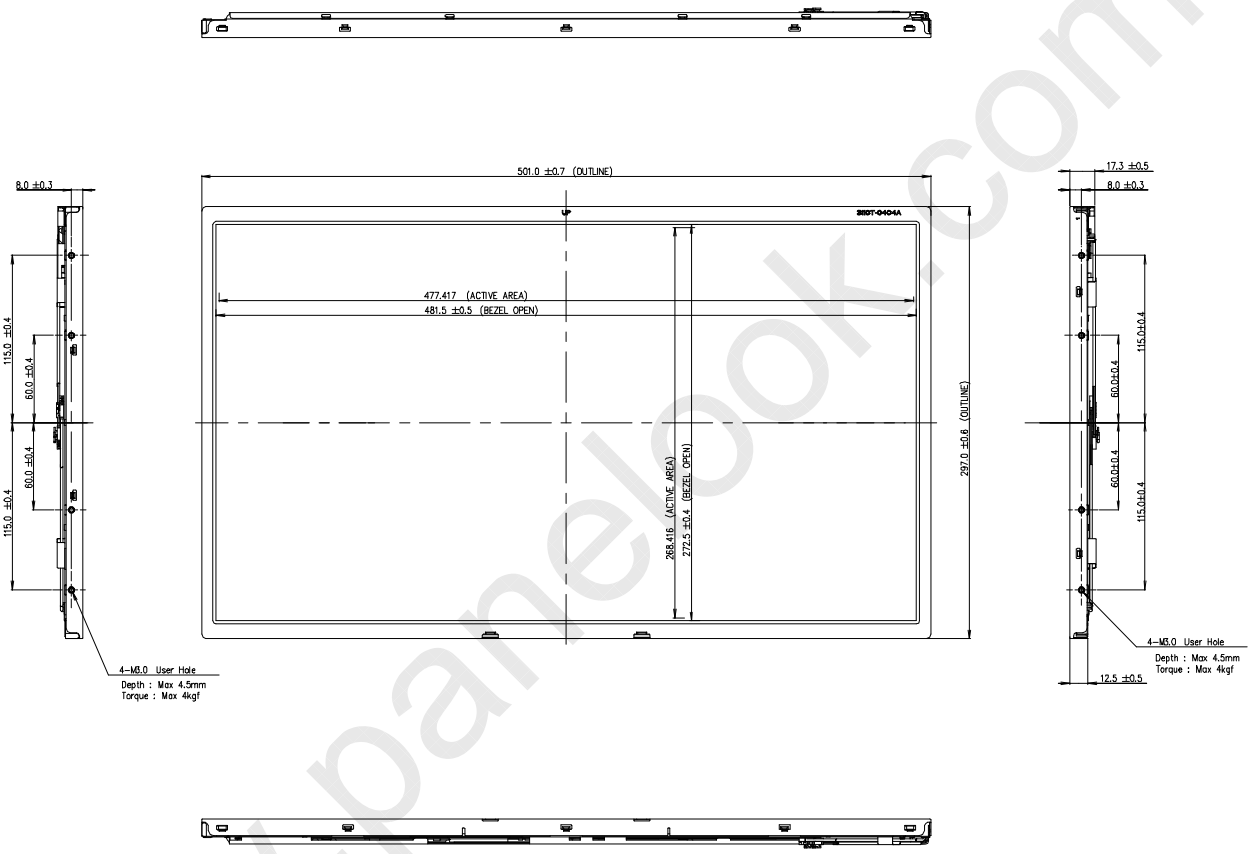
Note : Please refer to a mechanical drawing in terms of tolerance at the next page.

www.panelook.com

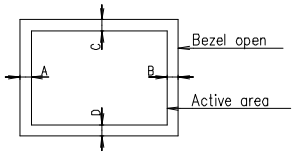
One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory! www.panelook.com

Global LCD Panel Exchange Center www.panelook.com 屏库:全球液晶屏交易中心

<FRONT VIEW>



NOTES
1. Unspecified tolerances are to be ±0.5mm.
2. This drawing is only preliminary data and can be changed without notice.
3. Tilt and partial disposition tolerance of display area is as following.
   (1) X-Direction : IA-BI 1.0mm
   (2) Y-Direction : IC-DI 1.0mm

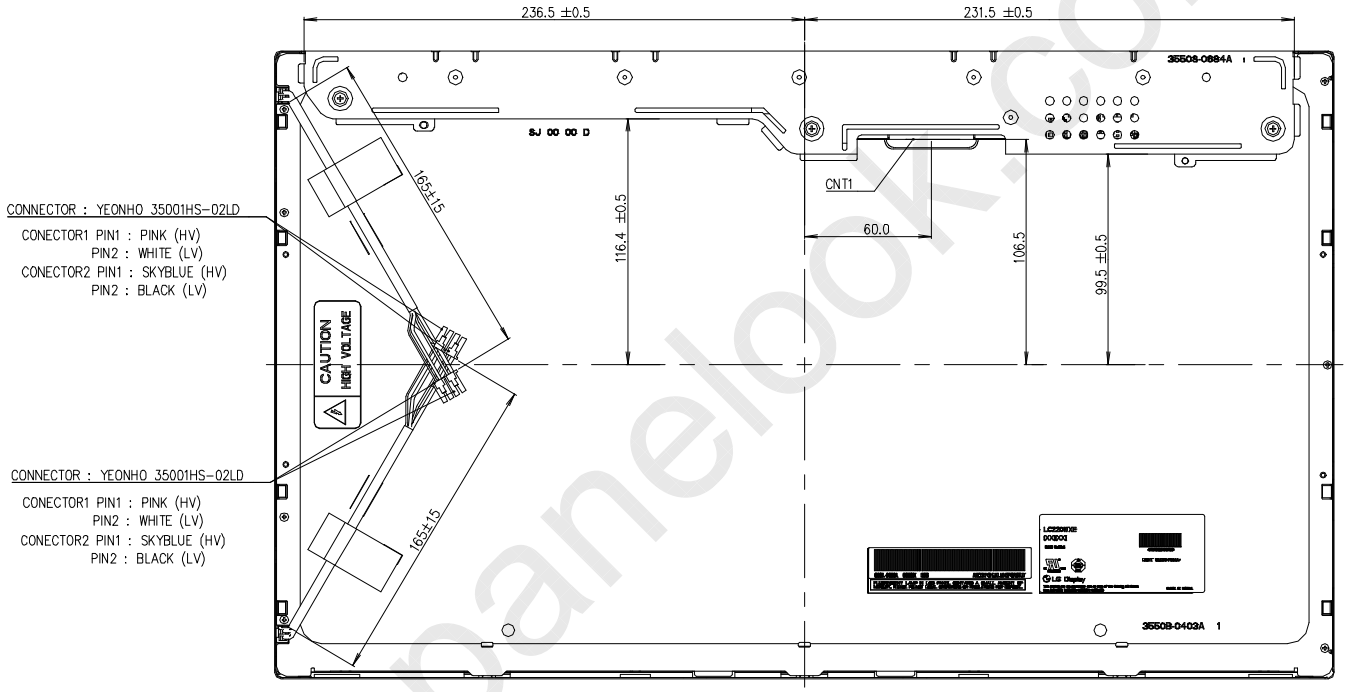


4. Backlight wires and contraction tubes are excluded from outline dimension.
5. Do not wind conductive tape around the backlight wires.

One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory! www.panelook.com

Global LCD Panel Exchange Center www.panelook.com 屏库:全球液晶屏交易中心

<REAR VIEW>



www.panelook.com

One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory! www.panelook.com

Global LCD Panel Exchange Center www.panelook.com 屏库:全球液晶屏交易中心

6. Reliability

Table 13. ENVIRONMENT TEST CONDITION

No.	Test Item	Condition
1	High temperature storage test	Ta= 60°C 75%RH 240h
2	Low temperature storage test	Ta= -20°C 240h
3	High temperature operation test	Ta= 50°C 60%RH 240h
4	Low temperature operation test	Ta= 0°C 240h
5	Vibration test (non-operating)	Wave form : random Vibration level : 1.0Grms Bandwidth : 10-300Hz Duration : X,Y,Z, Each direction per 20min
6	Shock test (non-operating)	Shock level : 120Grms Waveform : half sine wave, 2ms Direction : ±X, ±Y, ±Z Each direction per 20min
7	ESD test	Condition : 150pF, 330 ohm Case , air Evaluation : ± 15kV
8	Humidity condition Operation	Ta= 40 °C ,90%RH
9	Altitude operating storage / shipment	0 - 15,000 ft 0 - 40,000 ft

Note : Before and after Reliability test, LCM should be operated with normal function.

One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory! www.panelook.com

Global LCD Panel Exchange Center www.panelook.com 屏库:全球液晶屏交易中心

7. International Standards

7-1. Safety

a) UL 60065, 7th Edition, dated June 30, 2003, Underwriters Laboratories, Inc., Standard for Audio, Video and Similar Electronic Apparatus.
b) CAN/CSA C22.2, No. 60065:03, Canadian Standards Association, Standard for Audio, Video and Similar Electronic Apparatus.
c) IEC60065:2001, 7th Edition CB-scheme and EN 60065:2002, Safety requirements for Audio, Video and Similar Electronic Apparatus..

7-2. EMC

a) ANSI C63.4 “Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electrical Equipment in the Range of 9kHZ to 40GHz. “American National Standards Institute(ANSI), 1992
b) CISPR13 "Limits and Methods of Measurement of Radio interference characteristics of Sound and Television broadcast receivers and associated equipment"
CISPR22 "Limits and Methods of Measurement of Radio interference characteristics of Information Technology Equipment" International Special Committee on Radio Interference.
c) EN55013 "Limits and Methods of Measurement of Radio interference characteristics of Sound and Television broadcast receivers and associated equipment"
EN55022 "Limits and Methods of Measurement of Radio interference characteristics of Information Technology Equipment" European Committee for Electro Technical Standardization (CENELEC), 1988(Including A1:2000)

www.panelook.com

One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory! www.panelook.com

Global LCD Panel Exchange Center www.panelook.com 屏库:全球液晶屏交易中心

8. Packing

8-1. Information of LCM Label

a) Lot Mark

A	B	C	D	E	F	G	H	I	J	K	L	M

A,B,C : SIZE(INCH)
D : YEAR
E : MONTH
F ~ M : SERIAL NO.

Note

1. YEAR

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Mark	1	2	3	4	5	6	7	8	9	0

2. MONTH

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mark	1	2	4	4	5	6	7	8	9	A	B	C

b) Location of Lot Mark

Serial NO. is printed on the label. The label is attached to the backside of the LCD module.
This is subject to change without prior notice.

8-2. Packing Form

a) Package quantity in one box : 7 pcs

b) Box Size : 550 mm X 314 mm X 402 mm.

One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory! www.panelook.com

Global LCD Panel Exchange Center www.panelook.com 屏库:全球液晶屏交易中心

9. Precautions

Please pay attention to the followings when you use this TFT LCD module.

9-1. Mounting Precautions

(1) You must mount a module using specified mounting holes (Details refer to the drawings).
(2) You should consider the mounting structure so that uneven force (ex. Twisted stress) is not applied to the module. And the case on which a module is mounted should have sufficient strength so that external force is not transmitted directly to the module.
(3) Please attach the surface transparent protective plate to the surface in order to protect the polarizer. Transparent protective plate should have sufficient strength in order to the resist external force.
(4) You should adopt radiation structure to satisfy the temperature specification.
(5) Acetic acid type and chlorine type materials for the cover case are not desirable because the former generates corrosive gas of attacking the polarizer at high temperature and the latter causes circuit break by electro-chemical reaction.
(6) Do not touch, push or rub the exposed polarizers with glass, tweezers or anything harder than HB pencil lead. And please do not rub with dust clothes with chemical treatment.
Do not touch the surface of polarizer for bare hand or greasy cloth.(Some cosmetics are detrimental to the polarizer.)
(7) When the surface becomes dusty, please wipe gently with absorbent cotton or other soft materials like chamois soaks with petroleum benzine. Normal-hexane is recommended for cleaning the adhesives used to attach front / rear polarizers. Do not use acetone, toluene and alcohol because they cause chemical damage to the polarizer.
(8) Wipe off saliva or water drops as soon as possible. Their long time contact with polarizer causes deformations and color fading.
(9) Do not open the case because inside circuits do not have sufficient strength.

9-2. Operating Precautions

(1) The spike noise causes the mis-operation of circuits. It should be lower than following voltage :
V=±200mV(Over and under shoot voltage)
(2) Response time depends on the temperature.(In lower temperature, it becomes longer.)
(3) Brightness depends on the temperature. (In lower temperature, it becomes lower.)
And in lower temperature, response time(required time that brightness is stable after turned on) becomes longer
(4) Be careful for condensation at sudden temperature change.Condensation makes damage to polarizer or electrical contacted parts. And after fading condensation, smear or spot will occur.
(5) When fixed patterns are displayed for a long time, remnant image is likely to occur.
(6) Module has high frequency circuits. Sufficient suppression to the electromagnetic interference shall be done by system manufacturers. Grounding and shielding methods may be important to minimized the interference.
(7) Please do not give any mechanical and/or acoustical impact to LCM. Otherwise, LCM can't be operated its full characteristics perfectly.
(8) A screw which is fastened up the steels should be a machine screw.
(if not, it can causes conductive particles and deal LCM a fatal blow)
(9) Please do not set LCD on its edge.
(10) Partial darkness may happen during 3~5 minutes when LCM is operated initially in condition that luminance is under 40% at low temperature (under 5℃). This phenomenon which disappears naturally after 3~5 minutes is not a problem about reliability but LCD characteristic

One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory! www.panelook.com

Global LCD Panel Exchange Center www.panelook.com 屏库:全球液晶屏交易中心

9-3. Electrostatic Discharge Control

Since a module is composed of electronic circuits, it is not strong to electrostatic discharge. Make certain that treatment persons are connected to ground through wrist band etc. And don't touch interface pin directly.

9-4. Precautions for Strong Light Exposure

Strong light exposure causes degradation of polarizer and color filter.

9-5. Storage

When storing modules as spares for a long time, the following precautions are necessary.

(1) Store them in a dark place. Do not expose the module to sunlight or fluorescent light. Keep the temperature between 5°C and 35°C at normal humidity.
(2) The polarizer surface should not come in contact with any other object.
It is recommended that they be stored in the container in which they were shipped.

9-6. Handling Precautions for Protection Film

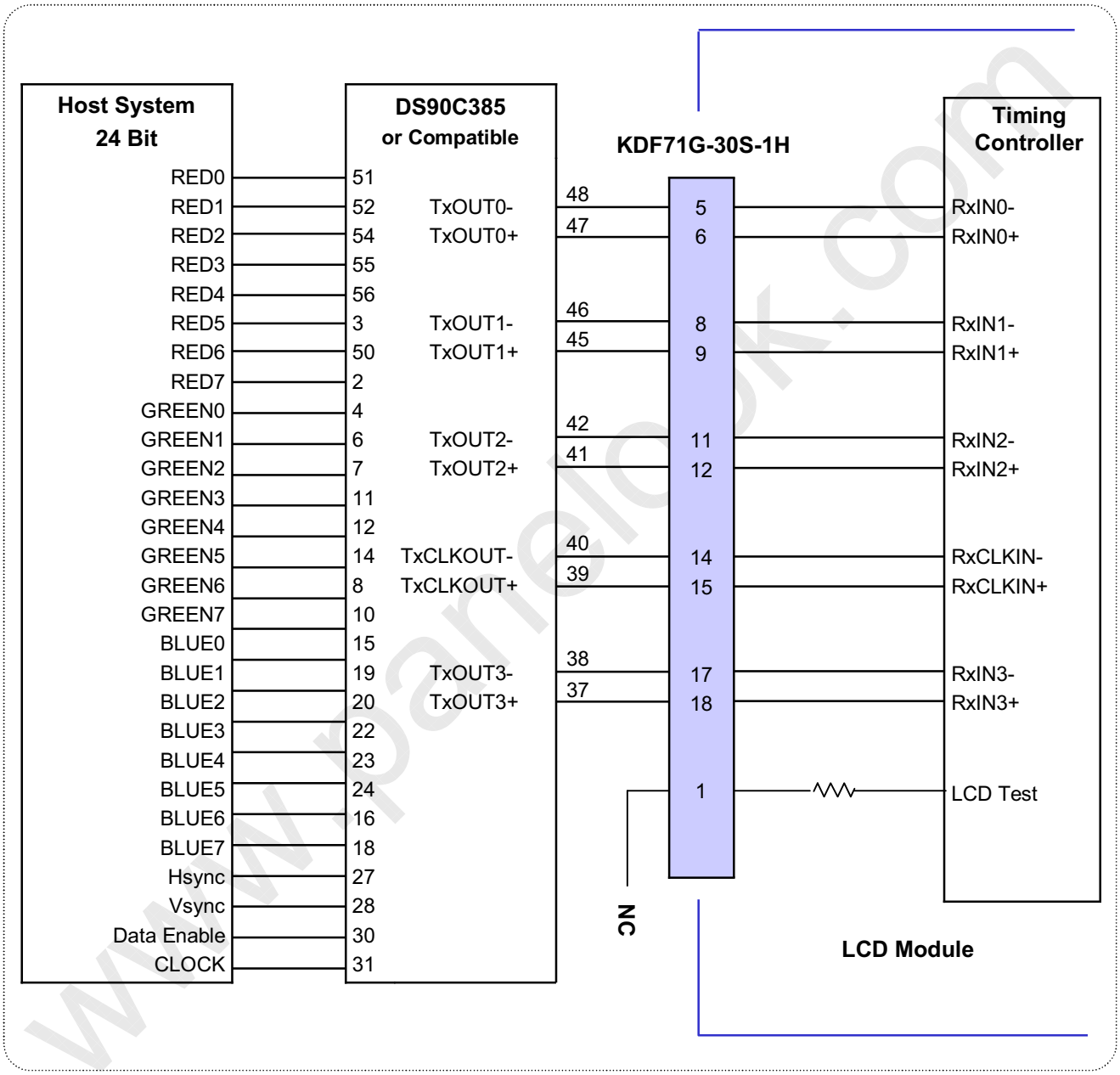
(1) The protection film is attached to the bezel with a small masking tape.
When the protection film is peeled off, static electricity is generated between the film and polarizer.
This should be peeled off slowly and carefully by people who are electrically grounded and with well ion-blown equipment or in such a condition, etc.
(2) When the module with protection film attached is stored for a long time, sometimes there remains a very small amount of glue still on the bezel after the protection film is peeled off.
(3) You can remove the glue easily. When the glue remains on the bezel surface or its vestige is recognized, please wipe them off with absorbent cotton waste or other soft material like chamois soaked with normal-hexane.

One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory! www.panelook.com

Global LCD Panel Exchange Center www.panelook.com 屏库:全球液晶屏交易中心

APPENDIX- I

■ Required signal assignment for Flat Link Transmitter



Notes:

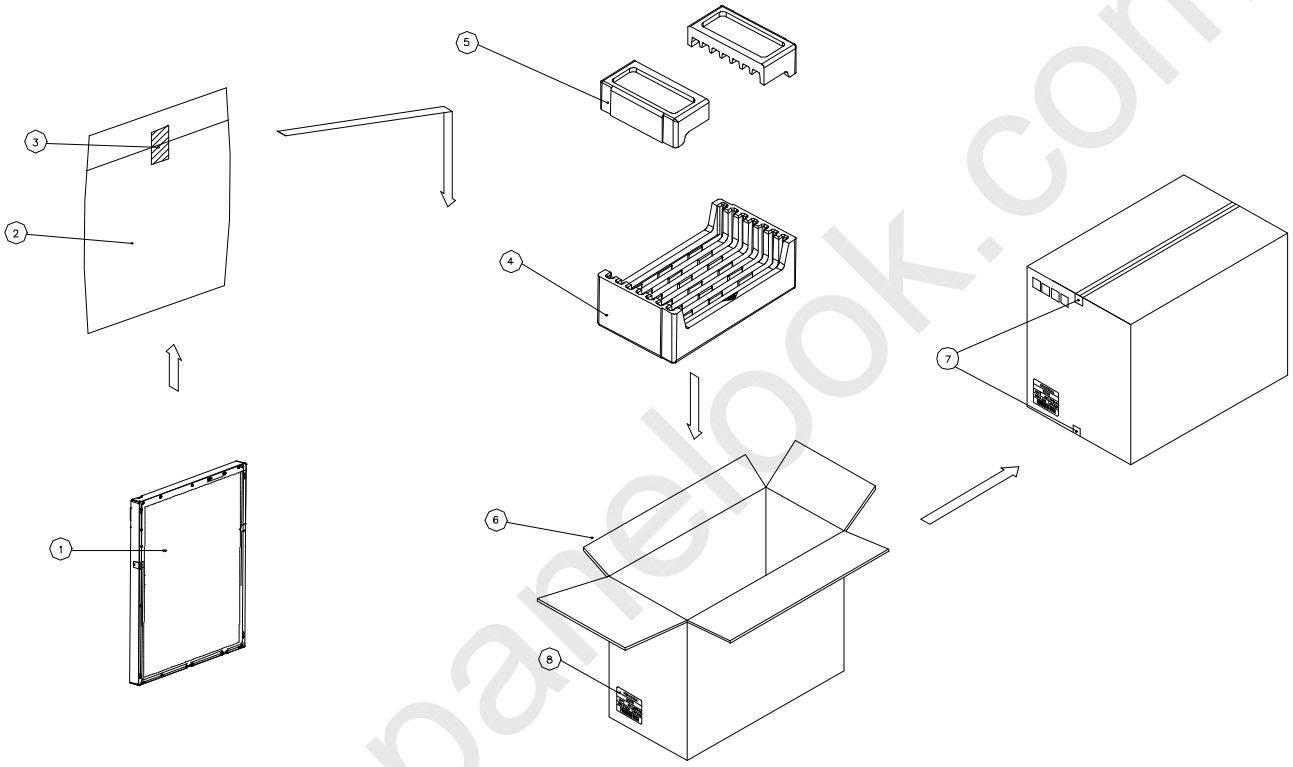
1. The LCD module uses a 100 ohm(Ω) resistor between positive and negative lines of T-con Internal.
2. Refer to LVDS transmitter data sheet for detail descriptions. (DS90C385 or Compatible)
3. ‘ 7’ means MSB and ‘0’ means LSB at R,G,B pixel data.

One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory! www.panelook.com

Global LCD Panel Exchange Center www.panelook.com 屏库:全球液晶屏交易中心

APPENDIX- II

■ LC220WXE-TBA1-Packing AssY



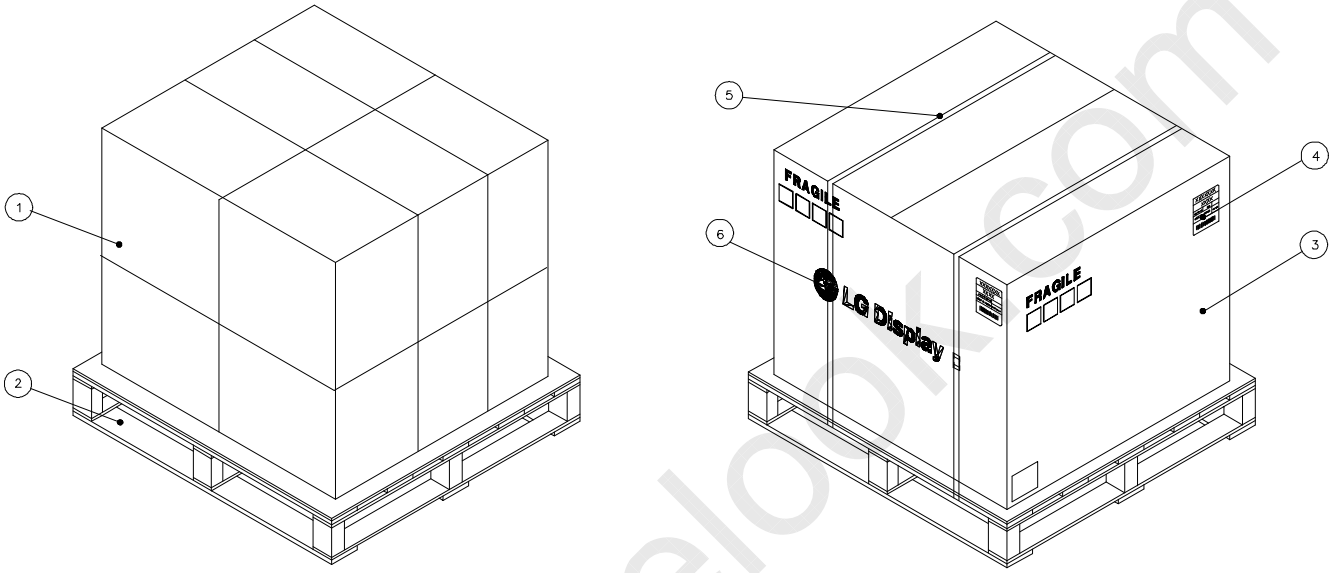
NO.	DESCRIPTION	MATERIAL
1	LCM	
2	BAG	PE
3	TAPE	OPP
4	PACKING, BOTTOM	EPS
5	PACKING, TOP	EPS
6	BOX	PAPER, SW
7	TAPE	OPP
8	LABEL	ART

One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory! www.panelook.com

Global LCD Panel Exchange Center www.panelook.com 屏库:全球液晶屏交易中心

APPENDIX- III

■ LC220WXE-TBA1-Pallet AssY



NO.	DESCRIPTION	MATERIAL
1	PACKING ASS'Y	
2	PALLET	PAPER
3	ANGLE, PACKING	SWR4
4	LABEL	YUPO PAPER
5	BAND	PP
6	BAND, CLIP	STEEL

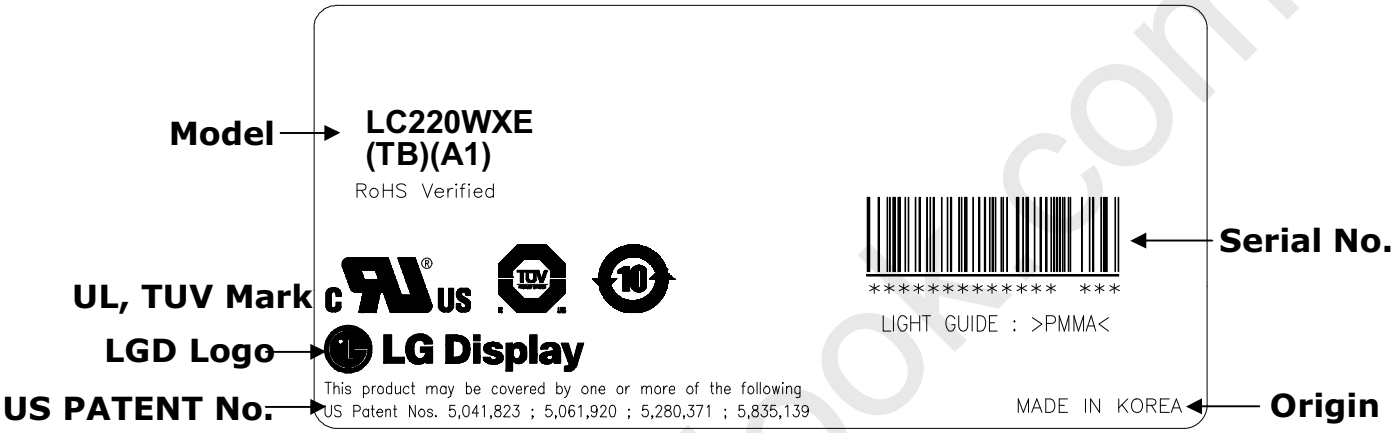
www.panelook.com

One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory! www.panelook.com

Global LCD Panel Exchange Center www.panelook.com 屏库:全球液晶屏交易中心

APPENDIX- IV

■ LCM Label



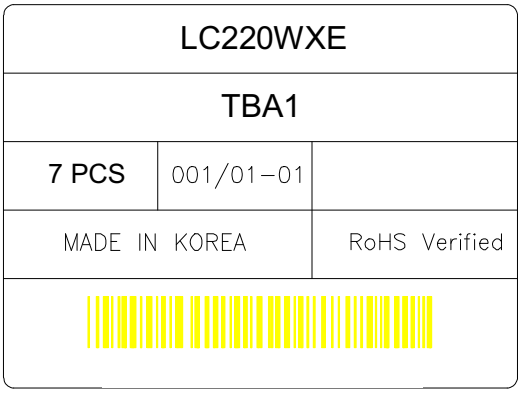
www.panelook.com

One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory! www.panelook.com

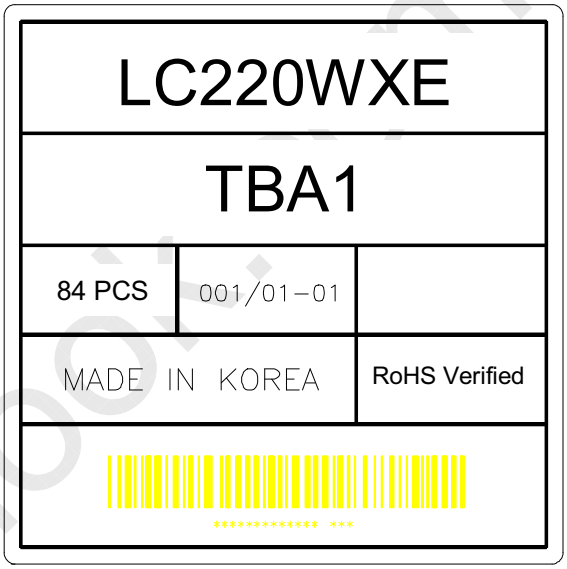
Global LCD Panel Exchange Center www.panelook.com 屏库:全球液晶屏交易中心

 # APPENDIX- V

■ Box Label



■ Pallet Label



www.panelook.com

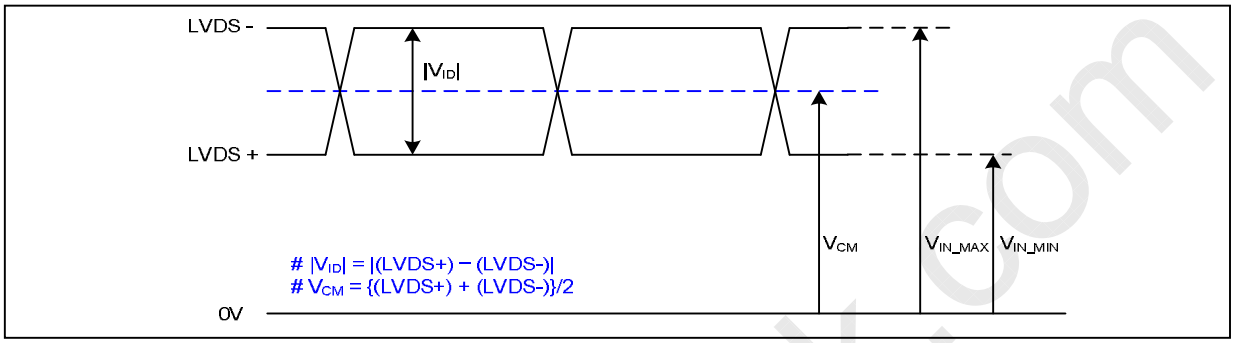
One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory! www.panelook.com

Global LCD Panel Exchange Center www.panelook.com 屏库:全球液晶屏交易中心

 # APPENDIX- VI

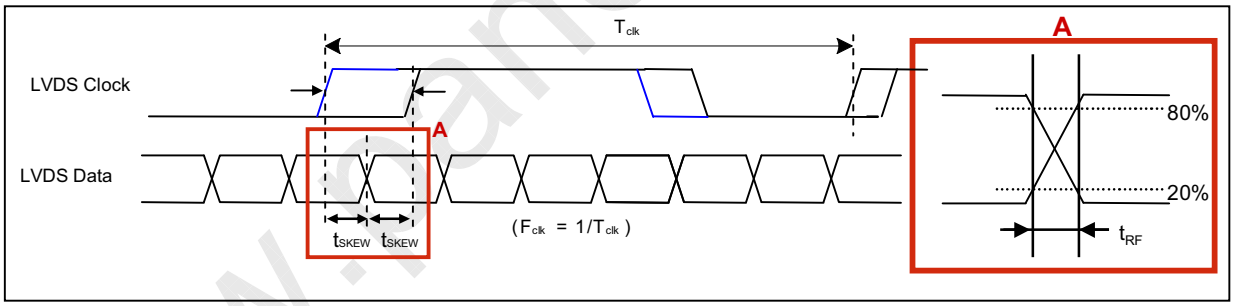
LVDS Input characteristics

1. DC Specification



Description	Symbol	Min	Max	Unit	Notes
LVDS Single end Voltage	$\|V_{ID}\|$	200	600	mV	-
LVDS Common mode Voltage	V_{CM}	1.0	1.5	V	-
LVDS Input Voltage Range	V_{IN}	0.7	1.8	V	-
Change in common mode Voltage	ΔV_{CM}		250	mV	-

2. AC Specification



Description	Symbol	Min	Max	Unit	Notes
LVDS Clock to Data Skew Margin	t_{SKEW}		$\|(0.25*T_{clk})/7\|$	ps	-
LVDS Clock/DATA Rising/Falling time	t_{RF}	260	$(0.3*T_{clk})/7$	ps	2
Effective time of LVDS	t_{eff}	±360		ps	-

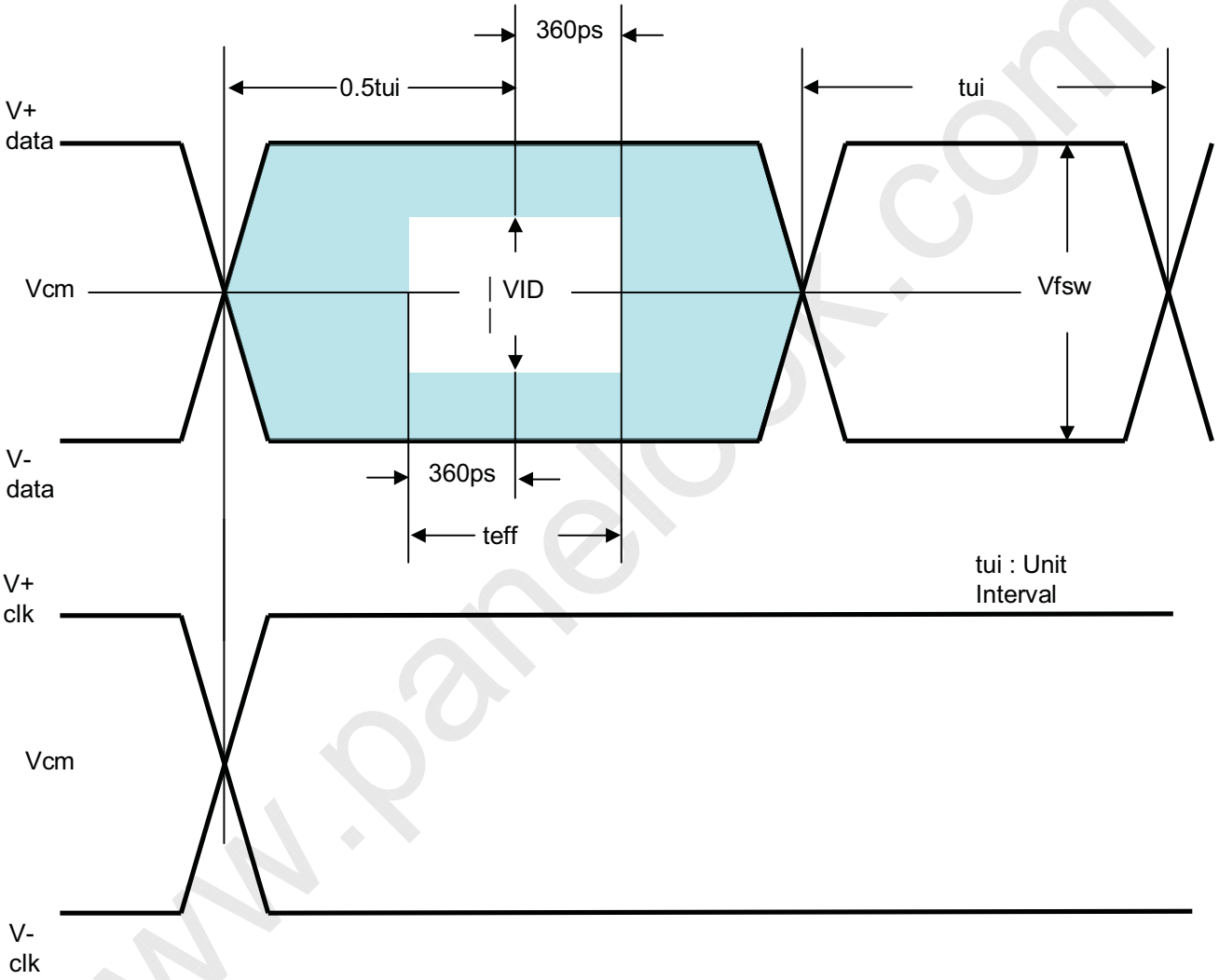
Notes : 1. All Input levels of LVDS signals are based on the EIA 644 Standard.
2. If t_{RF} isn't enough, t_{eff} should be meet the range.

One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory! www.panelook.com

Global LCD Panel Exchange Center www.panelook.com 屏库:全球液晶屏交易中心

 # APPENDIX- VI

LVDS Input characteristics



www.panelook.com

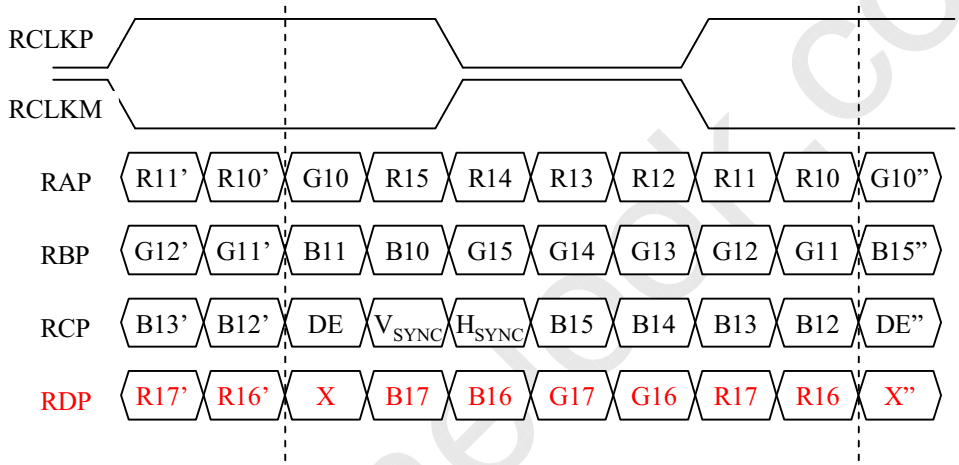
One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory! www.panelook.com

Global LCD Panel Exchange Center www.panelook.com 屏库:全球液晶屏交易中心

 # APPENDIX- VII

LVDS Data-Mapping info. (8bit)

■ LVDS : Data-Mapping (VESA format)



www.panelook.com

One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory! www.panelook.com